REMARKS

1. Posture of the case.

In the first Office action of April 3, 2003, claims 1 through 14 were rejected under 35 USC 112, second paragraph, as being indefinite, under 35 USC 101 as being directed to non-statutory subject matter, and under 35 USC 103(a) as being obvious with respect to Press et al. in view of Hayami et al. The claims were responsively amended and remarks submitted on July 24, 2003 to overcome these rejections.

In the final Office action of July 27, 2004, the rejections under 35 USC 112 were withdrawn, but claims 1 through 14 were again rejected under 35 USC 101 as being directed to non-statutory subject matter and under 35 USC 103(a) as being obvious with respect to Press et al. in view of Hayami et al. Applicant herein submits additional amendments and remarks to overcome the rejections.

2. Rejections under 35 U.S.C. 101.

The claims stand rejected on grounds that the claims do not involve a physical transformation or limitations to a practical application. Applicant herein amends claims 1, 4, 7, 10 and 14 to incorporate aspects of the claimed invention in the body of the claims and to make clear a practical application of the claimed invention. No new matter is added. Support for the amendments are clear from the face of the claims themselves. Applicant contends that since the claims point out that the invention includes determining if equations are a proper representation for a simulation of a physical system, this is a practical application.

3. Rejections under 35 U.S.C. 103(a).

First, according to the teachings of the present patent application, eij and bi include *algebraic expressions*. Present application, page 7, lines 5-6. This is unlike the teachings of Press et al., in which coefficients aij and quantities bi are *numbers*. See Press et al., page 22 (stating, regarding equation 2.0.1, "Here the N unknowns xj . . . are related by M equations. The coefficients aij . . . are known *numbers*, as are the right-hand side *quantities* bi . . .") (emphasis added). The present application provides teachings that are useful to overcome difficulties that arise due to coefficients eij and quantities bi being algebraic expressions instead of numbers in the specific context wherein the equivalence of two sets of "linear algebraic equations" is to be decided.

Furthermore, because coefficients eij and quantities bi include algebraic expressions according to the teachings of the present application, even the *solutions* for algebraic variables x include *algebraic expressions*. Present application, page 11, lines 23-28 (each of the n unknowns xi is expressed in the form of an algebraic expression, such in the example shown, where $x_n = {}^{n-1}b_n / {}^{n-1}e_{nn}$). The word "algebraic" in the phrase "linear algebraic equations" is conventionally used to indicate that certain terms in the equations, such as unknowns xj in Press et al. equation 2.0.1, appear as algebraic variables *prior to* a determination of solutions for the equations. This does not mean that the *solutions* for algebraic variables xj as taught by Press et al. include algebraic expressions, as in the teachings of the present application.

Second, the Office action contends that lii and ri in the present application are like a44 and b44 in the book by Press et al., "Numerical Recipes in Fortran . . ." The Office action contends Press et al. show a44 in equation 2.3.13, that a44 and b 44 are algebraic expressions (pages 32-36) and that b can be determined based on a, in accordance with equation 2.3.6. However, applicant contends the reference in the Office action to Press et al. equations 2.3.6 and 2.3.13 and pages 32-36 are misplaced. In the context in which they appear in Press et al., only yj and xj are algebraic variables. All other coefficients and quantities are numbers, including a44 and b44. The solutions for yj and xj yield numbers, not algebraic expressions. Furthermore, the method to which the equations and teachings are related to is the well-known LU decomposition method, which is quite different from the Gaussian elimination method disclosed for the preferred embodiment of the present invention.

Third, the teaching relied upon in Hayami et al. for the rejection is about function manipulation using the associate law in equations 19 and 20 (in column 9), and also teaching about how the result of x' can be computed or compared by multiplying M and y'. The Office action analogizes these teachings of Hayami et al. to the later part of claim 1, which states that the method includes "comparing, for each of said unknowns, the product (lii)1*(ri)2 and a product (lii)2*(ri)1, wherein said first and said second set of simultaneous linear algebraic equations are equivalent if said products match for all said unknowns."

The method described by Hayami et al. teaches about a case where coefficients aij are numerical elements of a square real symmetric matrix. The present application does not teach that corresponding coefficients aij in the present application are constrained to being coefficients in a symmetric matrix. The matrix M of Hayami et al. (which is different from the M used above in

the context of Press et al.) is an approximate matrix derived from the coefficients aij, which are the elements of the matrix A in Hayami et al. The present application does not teach that any such approximate matrix is involved in the present case. Hayami's method also requires the use of the inverse of the matrix M in the solution process. The present application does not teach that any such matrix inversion operation is involved in the present case.

There is no analogy between what Hayami et al. have done and the present application. In the present application there is need to determine a numeric value for the unknown x's. For two given sets of SLAEs (simultaneous linear algebraic equations) it is merely required to know the lii and ri for each set of SLAEs. That is, for set 1, one must know (lii)1 and (ri)1, and likewise for set 2, one must know (lii)2 and (ri)2. To decide if the two sets of SLAEs are equivalent, the test "(lii)1*(ri)2 = (lii)2*(ri)1)?" is carried out. If the answer to the test is 'yes' for all i = 1, 2, ..., N, then the two sets of SLAEs are equivalent. Otherwise they are not. The answer to the test will be 'yes' only if the corresponding xi for the two sets of SLAEs are the same.

If aij and bi are not all numbers, directly comparing algebraic expressions for the xi, in general, does not appear feasible. Certainly the teachings relied upon in the rejections do note make such comparison feasible. The arrangement of the present invention avoids necessity for explicitly determining algebraic expressions for xi in either of the sets. For the present invention, a comparison is instead made of cross products (lii)1*(ri)2 and (lii)2*(ri)1, where the lii of the first set of SLAEs is multiplied with the ri of the second set of SLAEs, and vice-versa. This is because determining common factors between (lii)1 and (ri)1, and likewise between (lii)2 and (ri)2, is not always feasible to effect a more direct comparison.

REQUESTED ACTION

Applicant contends that the invention as claimed in accordance with amendments submitted herein is patentably distinct, and hereby requests that Examiner grant allowance and prompt passage of the application to issuance.

Respectfully submitted,

Anthony VS England

Anthony V. S. England
Attorney for Applicants
Registration No. 35,129
512-477-7165
a@aengland.com